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ABSTRACT

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THE ECONOMIC VALUE OF ACADEMIC AND VOCATIONAL TRAINING ACQUIRED IN HIGH SCHOOL

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ABSTRACT

This study examines whether differences in high school curricula lead to differences in labor market opportunities for persons who complete 10 to 12 years of schooling and acquire no postsecondary training. Data come from a national longitudinal survey of youth began in 1979, and include detailed information on course work taken from high school transcripts. The results show no systematic advantage of one high school curriculum relative to another, although in some instances--for some students and in some areas--vocational preparation produces superior labor market effects than other curricula.

I. INTRODUCTION

Do differences in high school curricula make any difference once students leave school? Curriculum differences do appear to influence the likelihood of students attending college: those who follow a college preparatory program are more likely to attend college than students who follow other programs (Alexander, Cook, McGill 1978; Kolstad 1979). Curriculum differences also influence the type of college attended and even the choice of college major (Polachek 1978). But for those students who do not attend college, differences in high school curriculum appear to have little effect on labor market opportunities (Griffin and Alexander 1978). In particular, students who follow a vocational curriculum in high school enjoy no advantage in labor market opportunities over other students.[1] Even more recent empirical studies, using better data and improved statistical techniques, have failed to find systematic advantages to high school vocational training.[2]

The failure to find differences in labor market opportunities from high school curriculum is perhaps most disturbing to promoters of vocational education. They have long held that vocational education provides better preparation for direct entry into the labor market immediately after high school than other curricula. This faith has spurred increased support for vocational education at both the state and federal level.

Other observers question whether differences in high school curricula should, in fact, lead to differences in labor market opportunities. On the one hand, if vocational training in high school simply develops

specific job skills useful in only a limited number of occupations, then graduates may not receive any relative advantage in earnings or other labor market opportunities, either because the benefits accrue to employers or because initial earnings advantages decline as the number of vocational graduates increase in response to initial advantages (Grubb 1979; Gustman and Steinmeier 1980). On the other hand, if vocational training merely develops more basic skills comparable to skills learned in other curricula, then vocational graduates again may fail to enjoy an economic advantage over other high school graduates (Grubb 1979; Thurow 1979).

Thus at least in theory, it remains unclear whether differences in high school curriculum should lead to differences in labor market opportunities. Yet attempts to discern any differences remain.

Many past empirical studies suffer from several shortcomings. First, information on high school curriculum usually comes from students who are asked to identify their program as either college preparatory, vocational, or general. Curriculum differences may be understated because students mispercieve their high school program (Rosenbaum 1980; Meyer 1981). More important, using a single measure of curriculum differences may obscure large variations in actual course work. For example, vocational students who follow and complete a full program may be quite different than those who simply take a few unrelated vocational courses (Brown and Gilmartin 1980; Campbell, Orth, and Seitz 1981). Students who identify their program as academic (or college preparatory), vocational, or general frequently take courses in all three program

areas (Rumberger 1980; Meyer 1981). To identify curriculum differences with any accuracy thus requires information on specific courses taken by students.

Second, curriculum differences may make little difference in earnings and employment opportunities because high school graduates are frequently employed in low-skilled and low-level occupations (Ruebens 1974). Students who prepare for a specific job following high school by completing a legitimate vocational program may, in fact, enjoy an advantage over other graduates if they find a job related to their training. Although several studies have examined the relationship between area of training and the type of job found after high school (Campbell, et al. 1981; Woods and Haney 1981), few have examined the economic advantage of holding a training-related job.

This study will address both of these limitations, first by looking at differences in high school curricula in greater detail, and second by relating high school training to labor market outcomes more specifically, including an assessment of whether a student's vocational training was used on the job.[3]

We will also examine race and sex differences in both high school training and labor market opportunities. If high school training shows little effect on labor market outcomes, then race and sex differences in curriculum may explain little of the observed differences in labor market opportunities among these groups. Yet, if certain areas of vocational training do provide access to better paying jobs, then differences in high school curricula may be telling. Vocational training opportunities

in high school are clearly divided along sexual lines, with women more likely to enroll in office occupations training and young men more likely to pursue training in technical and industrial areas (Rumberger, 1980; p. 310). To a lesser degree there are also racial differences in vocational training opportunities. Thus, in some instances, race and sex differences in high school curricula may explain some of the differences in labor market opportunities after leaving school.

The data for this study come from the new youth cohort of the National Longitudinal Surveys (NLS) of Labor Market Experience (Center for Human Resource Research 1981). The survey consists of a series of annual interviews of a national sample of approximately 12,000 young men and women between the ages of 14 and 21, with an over-representation of blacks, Hispanics, and poor whites. The data include a variety of information on respondents' background characteristics, attitudes, aspirations, educational and labor market experiences, and other personal characteristics. The present analysis is based on data obtained from the first two surveys, conducted in 1979 and 1980.

During the first interview, respondents were asked to identify the name of the high school they were currently attending, or last attended. For those respondents who were 17 to 21 years old in 1979 and who had last attended an American high school (8,420 out of 11,406 respondents), efforts were made to collect high school transcripts and school information.[4] Complete transcript data was collected for 6,591 respondents (78 percent of those eligible). We further restricted the sample to those respondents who were not enrolled full-time during the second in-

terview, who had completed 9 to 12 years of schooling, and for whom complete transcript data were available for all years of school completed.[5] These further restrictions resulted in a sample of 1,857 respondents. Throughout the analysis, observations were weighted by their sample weights to adjust for the over-sampling of blacks, Hispanics, and disadvantaged whites.

In the remainder of this paper we first describe the kinds of courses that these students took in high school. Then we proceed to examine what effects their high school training has had on their labor market opportunities after leaving school.[6]

II. ACADEMIC AND VOCATIONAL TRAINING IN HIGH SCHOOL

In this study we grouped courses into three areas: academic, vocational, and other. Academic courses consist of language arts, foreign languages, mathematics, natural sciences, and social sciences. Vocational courses consist of agriculture, distributive education, health occupations, home economics, office occupations, and technical, trades and industry.[7] All remaining courses, including business, industrial arts, art, music, and physical education fall into the "other" category.[8] We chose these major divisions to differentiate between the general skills acquired from academic courses and the specific skills acquired from vocational training. Credits and grades for all 10th, 11th, and 12th grade courses in which a student received a passing grade were used to compute average credits within specific course categories and major curriculum areas.

Graduates completed a total of 15.4 credits during their last three years of high school, whereas dropouts completed an average of only 5.4 credits (Table 1). Graduates completed an average of 8 credits in academic subjects (52 percent of their total credits), 3.5 credits in vocational subjects (23 percent), and 3.9 credits in other subject areas (25 percent). As we might expect, students who identified their high school program as college preparatory took more academic subjects than other students, while vocational students took more of their course work in vocational areas. Within the academic area, students had the most credits in language arts and social sciences; within the vocational area, students had the majority of their credits in home economics, office occupations, and trades and industry. Students also took a number of courses in miscellaneous areas such as health, driver education, and physical education.

As these figures illustrate, students in all three program areas often take both academic and vocational courses. Thus, program designation may reveal little about the actual academic and vocational preparation a student receives in high school. This problem may be especially acute in vocational areas that involve specific training In order to accurately assess the effectiveness of vocational training, it is necessary to correctly identify vocational students. One way to do this is to examine what proportion of students who identify themselves as vocational students actually have completed a given number of credits in the vocational area in which they are training.[9]

Such an examination reveals that a significant proportion of vocational students have taken less than 3 credits in the specific area in which they were training (Table 2). In fact, the transcripts of some students show that they have not received credit for a single course in their specific area. The proportions of students receiving given numbers of credits also varies widely by area -- three-quarters of vocational students in office occupations had completed 3 or more credits in that area, whereas less than a third of vocational students in distributive education and health occupations had done so. Some students in other vocational areas and in college preparatory and general programs have also completed 3 or more credits in more specific vocational areas.

Instead of the program designation offered by students themselves, the benchmark of 3 credits will be used in the next part of this study to identify vocational students.[10] Of course, not everyone who has completed 3 credits of vocational courses in a specific area has completed a program in that area:

> An instructional program is a combination of courses and experiences that is designed to accomplish a predetermined objective or set of allied objectives such as preparation for advanced study, qualification for an occupation or range of occupations, or simply the increase of knowledge and understanding (Chismore and Hill 1978, p. 165).

Each vocational program consists of a particular sequence and number of courses. Although the benchmark of 3 credits only provides an approximate indication of students who have completed a vocational program, it offers a marked improvement over the program identification used in most previous studies.

The mean numbers of credits in various curriculum areas for specific race-sex groups of high school graduates are shown in Table 3. Other than the observation that white women seem to be more likely than minority women to take vocational training in office occupations, there appears to be little in the way of systematic racial differences in high school curriculum. Not surprisingly, we find large sex differences in types of vocational courses taken: women tend to concentrate in office occupations and home economics, while men tend to concentrate in trades and industries.

III. EFFECTS ON LABOR MARKET OUTCOMES

The effects of high school curriculum were estimated through a series of equations that expressed several measures of labor market success as a linear function of high school course work and an array of control variables. Estimates were derived using ordinary least squares regression. Course work represents the number of credits completed in various subject areas and was expressed in varying degrees of detail. Unlike previous studies that use dummy variables to distinguish between vocational, academic, and general curriculum areas, we were able to measure the actual amount of course work taken by each person in specific subject areas. Because our sample consists of persons who have completed from 9 to 12 years of schooling, the number of credits completed in grades 10-12 varies from zero to over 20. Thus, we can estimate the incremental effects of taking additional course work in various curriculum areas (quantity of schooling) as well as the relative effects of taking

more courses in one area (e.g., vocational) versus another area (e.g., academic).

In each equation the same set of control variables were included to minimize any bias due to students of different backgrounds and abilities selecting different high school subjects.[11] Background variables included a measure of parental education and a cultural index indicating the presence of newspapers, magazines, and a library card in the respondent's original home. The respondent's grade point average in the ninth grade was used as an early ability measure.[12] Additional control variables included race, marital status, children, sex-children interaction, and post-school experience.[13]

In order to examine different dimensions of labor market behavior and success, we analyzed three labor market outcome variables: hourly earnings in the 1980 survey week, the number of weeks unemployed in the previous year, and the number of hours worked in the previous year.[14]

Estimates were derived for respondents in our basic sample (1,857 cases) who had complete information on the dependent variables and information on most of the independent variables.[15] Males and females were analyzed separately, since they tend to have different labor market experiences and generally acquire different vocational training in high school. Estimates for each of the 3 dependent variables are shown in separate panels in Table 4 for males, and Table 5 for females. The estimated effects of the control variables are excluded from these tables, but they are shown for a representative equation in Appendix Table A-1.

As a reference point, the first equation in each table shows the effects of the standard measure of educational attainment -- years of school completed. The effect of years of school completed on hourly earnings (.047 for males, and .055 for females) are slightly lower, but fairly consistent with previous studies using a similar measure of educational attainment (e.g., Griliches, 1976). However, precise comparisons with the results of previous studies is difficult since we observe earnings very early in the work career and restrict our analysis to those who do not go on to college. Although not shown in the tables, we also ran the years completed equation adding a "diploma" variable to test for a credentialism effect. Surprisingly, there was no evidence of a credentialism effect.[16] In the second equation in each panel, we substituted total credits for years completed and found the results to be fairly consistent for men and women. As expected, both variables have positive effects on hourly earnings and hours worked and negative effects on weeks unemployed. Given that a normal school year usually consists of 5 or 6 credits, the size of the metric coefficients for years completed and total credits correspond very closely for women and moderately well for men. The main exception is that the effect of total credits on hourly earnings is quite small for men.

In the third equation, we partition credits into three basic categories: academic, vocational, and other. In most cases, academic and vocational course work have similar effects. For hourly earnings, the effects of both types of course work are insignificant for men and significant for women. The metric coefficients for women imply that a half-

day's course work for a school year (i.e., about 3 credit hours) of either academic or vocational courses would increase hourly earnings by about 3 percent. For weeks unemployed, the results imply that a half day's course work would reduce unemployment by about one to one and one half weeks per year, with the effects of academic training being stronger for men and the effects of vocational training being slightly stronger for women. Both academic and vocational training have strong effects on annual hours worked for women: a half day's course work of either is associated with working about 150 more hours per year, the equivalent of almost 4 weeks of full-time work. The biggest differences in effects is for hours worked for men: while the effect of vocational training is as strong is it is for women, the effect of academic training is insignificant.

Although not directly comparable, our results are fairly consistent with previous studies of the relative effects of vocational and academic courses. For example, using a set of dummy variables to measure curriculum, Grasso and Shea (1979) found that, net of the control variables, the labor market experiences of "the average male graduate of a vocational program who did not go on to college was not substantially different from that of the average general program graduate" (156). Results such as these have often been interpreted as negative evidence of vocational education. Our specification and results suggest that a more appropriate interpretation is that, in general, <u>both</u> academic and vocational curriculum have a significant positive impact on labor market success.

Other course work appears to have relatively small effects on labor market success. The main exception is for hours worked where other course work had a substantial positive effect for men. In addition, the effect of other courses on hourly earnings is non-trivial for women although its t-value is only 1.2 (Appendix Table A-1) and therefore not statistically significant at traditional levels.

We also performed parts of the analysis with the sample restricted to those who graduated from high school, and in which academic, vocational and other credits were coded as proportions of total credits. Since academic, vocational, other, and total credits are linearly dependent, the academic credits variable was omitted from the analysis and thus serves as a reference for evaluating the effects of vocational and other credits. This specification corresponds more closely to the traditional specification used by others (e.g., Grasso and Shea 1979; Meyer 1981; Woods and Haney 1981). The results from this alternative specification are similar to those discussed above in that the only instance in which the effects of vocational training is significantly different from academic training is the stronger and more positive effects of vocational training on hours worked for men.

Because vocational training may develop specific job skills, the labor market benefits of vocational courses that are part of a complete vocational program may be higher than the benefits from unrelated vocational courses. In order to examine this issue, two separate vocational training variables were created, a vocational program variable, and a non-program vocational variable. In the coding of these variables, all

of a student's vocational credits were counted either in the vocational program variable (if the student completed at least 3 credits in one specific vocational area), or in the non-program vocational variable. The results for the equations in which these two variables were substituted for the general vocational variable are shown as equation (4) in Tables 4 and 5. The effects of the vocational program variable for men were in the anticipated direction for all three labor market outcome variables, although its effect was not significant for hourly earnings. On the one hand, the non-program vocational variable had a detrimental effect on hourly earnings and unemployment, although its effect on hours worked was positive and significant. These results generally support the hypothesis that participating in a specific vocational program does have payoff in the labor market while an occasional vocational course does not. The evidence for women is less conclusive: the effects of non-program vocational training on weeks unemployed and hours worked is as strong or strong than that of training in a specific vocational program. Only for unemployment is the effect of the vocational program variable somewhat stronger.

Again, because vocational training may develop specific job skills, its economic benefits may also depend on whether or not the individual is employed in an occupation where the training can be utilized.[17] To test this notion, vocational program credits were further partitioned into two categories: one for program credits related to the respondent's occupation, the other for the remaining program credits. The occupational and educational code crosswalk prepared by the National Occupational

Information Coordinating Committee (1979) was used to partition program credits. For each specific vocational area, the crosswalk provides a list of occupations that were judged to use the skills taught in that area.[18] These two variables were substituted for the vocational program variable in equation (5), Tables 4 and 5. These results show that for both men and women and for each labor market outcome, the effect of vocational training used on the job is significant and substantially greater than the effect of vocational training that is not used on the job. Thus, it appears that vocational training yields a higher payoff for those individuals who are employed in jobs where their training can be utilized.

How many men and women hold jobs related to their area of high school vocational training? Table 7 shows the proportion of students taking (or not taking) vocational programs in specific areas whose occupation corresponded to that area. For example, the top row of the table indicates that among young men who took a vocational program in agriculture, 42 percent held an occupation in 1980 that corresponded to that area, while only 17 percent of other men (i.e., those who took a different vocational program or no vocational program at all) held that type of job. In most areas vocational training substantially increases the likelihood of an individual obtaining related employment. Apparently, either these programs are teaching important job related skills, or at least many employers think they do. Two exceptions to this general finding are trades and industry, and home economics. For both men and women, the likelihood of students in these areas finding related employ-

ment is about the same as other students in finding similar employment.[19]

The variation across programs in the degree that training was used on the job raises the question of whether the labor market returns to vocational training varied by specific area of study. To examine this issue, we further partitioned our vocational training variables into detailed areas while retaining the distinction between whether the training constituted a program, and if so, whether it was used on the job. However, the small number of men and women taking training in some areas required the combining of smaller vocational areas into one category (Table 8). In addition, we divided the academic credits into specific areas. Dividing academic and vocational credits into these detailed categories reduces the precision of the estimated effects; thus, they need to be interpreted very cautiously.

Within specific academic areas, few systematic patterns emerge. For men, language arts stands out as the strongest determinant of hourly earnings, while language arts, mathematics and the natural sciences all have moderate effects on unemployment and hours worked. For women, the social sciences and foreign languages have the greatest impact on hourly earnings, while the natural sciences and foreign languages have the strongest effects on unemployment and hours worked.

Within vocational areas, the effects of the variables measuring non-program vocational training and vocational program training not used on the job appear to be rather unstable, so we will restrict our attention to the effects of vocational program training used on the job. For men,

it appears that trades and industry training increases hourly earnings somewhat (though the coefficient is not significant) but has little effect on unemployment or hours worked, while other types of vocational training, including agriculture, have no positive effect on hourly earnings, but do have a substantial favorable impact on unemployment and hours worked. For women, training in office occupations stands out as having the strongest favorable effect on each dimension of labor market success. Although training in home economics appears to increase hours worked and decrease unemployment for women, its effect on hourly earnings is not favorable.

Another question we explored is whether different types of course work are more or less helpful to different types of students. For example, it is widely believed that the students who are at a disadvantage either because of race, ethnicity, social background, or cognitive abilities will be the primary beneficiaries of vocational training. Our sample is already restricted to those who do not go on to college and, thus, already contains an overrepresentation of disadvantaged students. However, to further explore this issue, we reestimated the effects of academic, vocational, and other credits (i.e., equation (3) in Tables 4 and 5) on labor market outcomes for several subsamples which distinguish between individuals who might be considered to be either disadvantaged or not based upon race, ethnicity, social background, or cognitive ability. This analysis was not disaggregated by sex because the size of some of these subsamples is already quite small, and because the results presented thus far have suggested only small sex differences in the rela-

tive effects of academic and vocational course work. In terms of race ethnic differences, there appears to be little in the way of systematic pattern. However, there is some evidence that the effects of both academic and vocational training on hourly earnings are lower for blacks than for whites and Hispanics. It also appears that for Hispanics, the effects of both these types of course work are weaker for unemployment and stronger for hours worked than for other individuals (Table 9). The bottom four rows of Table 9 show the results for those who are above and below average for our sample in terms of social background or cognitive ability.[20] For unemployment and hours worked there are no systematic differences between the disadvantaged and the advantaged groups in the relative effects of academic and vocational training. For hourly earnings, vocational training has stronger effects than academic training for advantaged groups relative to disadvantaged groups. This finding contradicts the hypothesis that the disadvantaged are the primary beneficiaries of vocational training and suggests that perhaps the most important need for disadvantaged students is training in these basic skills.

IV. SUMMARY AND CONCLUSIONS

This study examined the economic value of academic and vocational education acquired in high school, using detailed information on course work available from high school transcripts. We attempted to discern whether differences in high school curricula lead to differences in labor market opportunities for persons who completed 10 to 12 years of schooling and acquired no postsecondary training. The economic vari-

ables consisted of hourly wage rates, annual weeks unemployed, and annual hours worked. Consistent with other studies, the results varied between men and women.

For women, academic and vocational training showed equally strong effects on the different dimensions of labor market behavior that we examined. Although the size of the effects have to be interpreted with caution, they do suggest that an additional half-day's course work for a school year (i.e., about 3 credit hours) of either academic or vocational course work would lead to about 3 percent higher hourly earnings, one to one and one-half fewer weeks of unemployment per year, and 150 more hours worked per year.

For men, the results vary depending upon the outcome variable being examined. The effects of both types of training on unemployment are as strong as for women, but their effects on hourly earnings are smaller and statistically insignificant. The only case in which there was a significant difference in the effects of these types or curriculum is for hours worked for men: while the effect of vocational training was as strong as it was for women, the effect of academic training was insignificant.

The payoff to vocational training appears to vary in several other respects. Vocational training that constitutes a specific program has a greater impact on labor market outcomes than vocational training in unrelated areas. In addition, the payoff to vocational program training is higher for persons employed in jobs where their training can be used. Moreover, except in the area of trades and industry, and home econom-

ics, vocational students were substantially more likely than other students to obtain employment in occupations that utilized their vocational skills. These results suggest that in order to measure the payoff to vocational training, it is necessary to have more detailed information on the type of vocational training taken and the area of employment. Of course, very large sample sizes are needed to estimate the relative effects of curriculum on labor market success with any precision.

The strongest vocational training effects were associated with training in office occupations. We suspect that these high returns result from the recent growth in the service and clerical sectors of the economy where this type of training is particularly demanded. In any event, this finding suggests that the demand side of youth labor market should be considered more carefully.

We observed substantial sex differences in the types of vocational training taken, with men concentrating in trades and industries and women concentrating in office occupations and home economics. This sex segregation in vocational training surely contributes to sex segregation in occupations. Although the relative payoff to the types of training taken by women appears to be at least as high as the payoff to the types of training taken by men, this segregation may help perpetuate inequality indirectly by contributing to the idea that it is natural for men and women to do different work. Greater access to all program areas should be afforded both men and women. Important parts of this effort would be to better inform boys and girls of career opportunities in both traditional and non-traditional areas, and to provide additional support for students in non-traditional areas once they have entered.

Racial differences in economic outcomes appear minimal. The effects of vocational training on hourly earnings were lower for blacks than for whites, but the effects of vocational training on unemployment and hours worked are similar for blacks, Hispanics, and whites. Since members of each of these groups take similar types of high school courses, vocational training appears to have little overall impact one way or the other on racial and ethnic inequality.

Our results compare quite closely with those of other recent studies.[21] Even with more detailed information available from high school records and more refined statistical techniques, these studies were unable to find systematic advantages to any single type of high school curriculum, particularly vocational.[22] This does not mean that vocational training has no economic value, but only that it has no more than any other training acquired in high school. Our results show that both vocational and academic curricula have positive results.

In general, it appears then that vocational and academic course work are substitutes for each other. In other words, they both develop general as opposed to specific skills, as some observers have suggested (Grubb 1979; Thurow 1979). Since vocational education is generally more costly than other forms of education (Hu and Stromsdorfer 1979), perhaps vocational training in high schools should be replaced with equally valuable academic training.

Such a conclusion may be premature, however. To fully assess the value of vocational education, it is necessary to consider other economic as well as educational benefits. Our study and many others have simply examined the economic payoff to high school curricula for students who acquire no additional postsecondary training. A more complete assessment of the economic value of different high school curricula should include its effects on subsequent training opportunities and the economic benefits that accrue from them (Meyer 1981). In terms of educational benefits, vocational curricula may be keeping students in school who otherwise might drop out (Reubens 1974). In both cases the benefits of vocational training should be assessed relative to its costs.

Based on our own analysis, we are not ready to conclude that vocational and academic training are perfect substitutes. At least for some areas, we found that vocational students were more likely than other students to obtain employment in occupations that utilize vocational skills. Apparently, either these programs are teaching important job related skills, or at least many employers think that they do. In addition, our results indicate that to a substantial degree for women, and to a lesser degree for men, the returns to vocational program training that was used on the job was greater then the returns to academic training. And some specific areas of vocational training--such as office occupations--appear to have greater returns in terms of earnings and employability than academic training, while other areas do not.

We conclude: in some cases--for some students and in some areas--vocational preparation produces superior labor market effects than acade-

mix training. In other cases it does not. More definitive conclusions await the results of future research.

FOOTNOTES

[1]Reviews of earlier empirical studies are found in Reubens (1974), Hu and Stromsdorfer (1979), and Mertens, et al. (1981).

[2]There have been a rash of recent empirical studies, generated in part by the availability of more detailed data and by recent federal interest in reviewing the value of vocational education. Studies include Grasso and Shea (1979), Wiley and Harnischfeger (1980), Campbell, et al. (1981), Meyer (1981), Gustman and Steinmeier (1981), Woods and Haney (1981).

[3]This study focuses on individual differences in high school experiences and their effects on opportunities after leaving school. Another body of literature examines the effects of school characteristics and resources on students performance and outcomes (e.g., Spady 1976; Griffin and Alexander 1978).

[4]The data that were collected and the procedures used to collect them are described in National Opinion Research Center (1980).

[5]The last requirement dictated that a student's transcript showed 3 or more credits of course work for each year of school completed. For example, high school graduates were required to have transcript information for grades 10-12 in order to be included in the sample. Whether or not these restrictions biased the sample in any particular way is something we are currently examining.

[6]We also examined the grades students received in their courses. Since students in this study did not attend college, their grades were

average -- 2.29 among this group, with high school graduates slightly higher and dropouts lower. Initially, we thought that the grades students receive in their courses might provide an indication of how much they learned in specific subject areas, and thus be related to labor market outcomes. But grades appeared to have no significant effects.

[7] Because so few students had completed credits in technical areas, this category was combined with trades and industry. Although home economics is technically a vocational program, it actually consists of both vocationally oriented home economics and consumer homemaking. We did not distinguish between the two, as others have done (e.g., Campbell, et al. 1981).

[8] Course categories correspond to standard curriculum areas (Putnam and Chrismore 1970). Thus, business and industrial arts courses were excluded from the vocational category even though they could develop job-specific skills similar to those developed in strict vocational areas. Using detailed course categories, we will be able to compare the effects of both kinds of training. Interestingly, little consensus exists among researchers on whether to treat business and industrial arts as vocational courses, or something else. Compare, for example, Campbell, et al. (1981, p. 13) and Woods and Haney (1981, p. 3-4-7).

[9] Students who identified their program as vocational were also asked to identify the specific vocational area of their program: agricultural, business or office, distributive education, health, home economics, trade or industrial, or other.

[10]Three credits represent a half-day of vocational training taken for a full year. This is the minimum amount of vocational training required to complete a program in certain subject areas. Other areas require more preparation. Campbell, Orth, and Seitz (1981) examine participation in vocational education in greater detail.

[11]Of course this approach only controls for selection bias associated with measured control variables. Systematic selection on unmeasured variables such as motivation or parental encouragement that is independent of the measured controls may also produce bias in the effects of high school curriculum on labor market success.

[12]Indicators of mental ability, primarily IQ test scores, were collected along with the transcripts. Although these test scores were preferred on a conceptual basis, we decided not to use them because of the low response rates (about 50 percent), differences in the kinds of tests taken, and the wide range in age when the test was taken.

[13]More specifically, the control variables were measured as follows: Parental education was the number of years of school completed by either the respondent's mother or father, whichever was greater. The cultural index was the sum of three dichotomous variables each indicating the presence (= 1) or absence (= 0) of newspapers, magazines, or a library card in the household when the respondent was 14 years old. Grade point average was computed from all courses taken in the ninth grade in which the student received a passing grade. Passing grades were converted into numerical equivalents, with A = 4, B = 3, C = 2, D = 1, and F = 0. The two race variables included an indicator for being black (= 1; 0 other-

wise) and an indicator for being Hispanic (= 1, 0 otherwise). Marital status equals 1 if married, spouse present; 0 otherwise. Children is the number of children living with the respondent. The sex-children interaction is the product of sex and children. Post-school experience is the number of months between the date the respondent last left school and the date of the interview.

[14]Since our sample ranges in age from 18 to 22 years of age, these variables measure labor market standing in most cases from 1 to 7 years after leaving school. Our results may be influenced by differences in the number of years since leaving school (although we control for this) as well as the particular year in which we measure labor market outcomes (1980). See discussions by Gustman and Steinmeir (1981), and Meyer (1981).

[15]Observations were excluded from an equation if they had missing data on any variable included in the equation except for parental education, the cultural index, and grade point average for the ninth grade. Race-sex specific means were substituted for missing data on parental education and cultural index. Grade point average for the ninth grade was estimated based on a regression equation including the following explanatory variables: black, Hispanic, sex, parental education, cultural index, knowledge of the world of work, age, early mental ability test score, and a dichotomous variable indicating missing data on any early ability test score. In addition, observations were eliminated from the weeks unemployed last year and hours worked last year regressions if

they had not been out of school for at least 12 months as of the date of the interview.

[16]The coefficient for the diploma variable (equal to one if the respondent received a high school diploma and equal to zero if not) was insignificant in 5 of the 6 equations and had the unexpected sign in half of them. More specifically, for men, the coefficients (and t values) were -.053 (-.7), -.38 (-.2), and -317 (-1.9) for hourly earnings, weeks unemployed, and hours worked, respectively. For women, they were .065 (.8), 2.72 (1.6), and -213 (-1.3).

[17]Such a payoff has been observed for other types of occupational training (Freeman 1974; Fredland and Little 1980).

[18]Although the crosswalk matches occupations to detailed vocational course categories, we only attempted to match respondents' occupations (1970 Census codes) to broad vocational categories (i.e., agriculture). For some of the more heterogeneous occupational categories (i.e., managerial, not elsewhere classified), we also required a match between the industry listed in the crosswalk and the respondent's industry.

[19]This may be partly due to the broad and heterogeneous nature of the trades and industry category of occupations. About 60 percent of all the occupations held by these men required skills related to trades and industry vocational training. Perhaps a matching of more detailed breakdown of these program areas and occupations would yield different results.

[20]Social background is measured using parental education; cognitive ability is measured using ninth grade GPA. See footnote 13 for a description of these variables.

[21]See footnote 2.

[22]These conclusions are quite consistent despite differences among the studies in terms of data and methodologies employed.

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Table 1 Mean Number of High School Credits by Graduation Status, Program, and Curriculum Area

Curriculum area	Graduates				Dropouts	Total
	College prep	Vocational	General	Total		
Academic	9.87	7.01	7.75	7.95	2.59	7.06
Language arts (05)	3.13	2.70	2.84	2.86	.99	2.54
Foreign languages (06)	.77	.24	.29	.37	.05	.32
Mathematics (11)	1.67	.96	1.09	1.16	.43	1.04
Natural sciences (11)	1.81	.94	1.10	1.19	.44	1.07
Social sciences (15)	2.49	2.16	2.43	2.37	.67	2.09
Vocational	2.16	5.08	3.14	3.49	.98	3.05
Agriculture (01)	.06	.16	.25	.19	.14	.18
Distributive ed. (04)	.11	.24	.16	.17	.06	.16
Health occupations (07)	.05	.08	.05	.06	.02	.05
Home economics (09)	.63	.80	.80	.77	.24	.65
Office occupations (14)	1.01	2.11	1.17	1.40	.20	1.20
Tech., trades & industry (16, 17)	.30	1.70	.70	.90	.32	.80
Other	3.56	3.51	4.29	3.93	1.86	3.61
Business (03)	.18	.23	.22	.22	.06	.19
Industrial arts (10)	.46	.78	.89	.78	.40	.71
Art, music (02, 12)	.90	.66	1.02	.90	.34	.81
Miscellaneous (08, 18-22)	2.03	1.82	2.16	2.05	1.06	1.91
Total	15.60	15.59	15.18	15.38	5.42	13.72

Note: Tabulations based on a weighted sample of 17 to 21 year olds who were not enrolled in school full-time in the winter of 1980, who had completed 9 to 12 years of school, and for whom complete transcript data were available (N=1857). One credit corresponds to a standard, full-year course. Only credits for courses taken in grades 10-12 are included. Numbers in parentheses refer to major curriculum areas designated by the Office of Education (Putnam and Chismore, 1970).

Table 2 High School Vocational Credits by Graduation Status, Program, and Curriculum Area

Vocational curriculum area	Graduates					
	Academic	Vocational		General	Dropouts	Total
		Specific[a]	Total			
Percent with some credits						
Agriculture	4	75	9	13	11	10
Distributive education	7	71	11	11	7	10
Health occupations	3	43	3	2	1	2
Home economics	44	81	50	60	19	46
Office occupations	56	96	59	61	21	53
Tech., trades & indus.	11	67	38	24	14	24
Percent with 3 or more credits						
Agriculture	1	56	2	4	1	3
Distributive education	1	40	4	2	1	2
Health occupations	1	32	1	1	1	1
Home economics	5	56	8	8	0	6
Office occupations	13	78	4	15	0	17
Tech., trades & indus.	5	54	7	12	6	13
Percent with 6 or more credits						
Agriculture	0	10	0	0	0	1
Distributive education	0	8	1	0	0	0
Health occupations	0	20	1	0	0	0
Home economics	1	27	12	1	0	3
Office occupations	1	31	14	2	0	4
Tech., trades & indus.	1	32	15	4	1	6

[a]Students whose specific vocational program corresponded to the vocational curriculum areas that are listed.

Table 3 Mean number of High School Credits by Sex, Race, and Curriculum Area

Curriculum area	Females			Males			Total
	Black	Hispanic	White	Black	Hispanic	White	
Academic	8.25	8.27	7.89	7.93	8.07	7.97	7.96
Language arts	2.94	2.81	2.89	2.98	2.80	2.81	2.86
Foreign languages	.43	.96	.45	.20	.58	.27	.37
Mathematics	1.31	1.10	1.04	1.30	1.25	1.26	1.16
Natural sciences	1.23	1.07	1.17	1.06	1.09	1.24	1.19
Social sciences	2.33	2.32	2.35	2.39	2.35	2.40	2.37
Vocational	3.58	3.38	4.23	2.88	2.48	2.84	3.49
Agriculture	.03	.05	.11	.21	.34	.29	.19
Distributive education	.28	.17	.13	.24	.05	.22	.18
Health occupations	.11	.03	.11	.01	.00	.00	.06
Home economics	1.39	1.13	1.14	.57	.36	.39	.77
Office occupations	1.46	1.83	2.45	.41	.34	.44	1.39
Tech., trades & indus.	.31	.17	.29	1.45	1.39	1.51	.89
Other	3.27	4.02	3.51	4.36	5.52	4.32	3.93
Business	.16	.17	.25	.14	.09	.20	.22
Industrial arts	.08	.11	.12	.85	1.39	1.52	.78
Art, music	.73	.94	1.17	.85	.81	.71	.90
Miscellaneous	2.30	2.80	1.97	2.53	2.93	1.90	2.05
Total	15.10	15.67	15.64	15.18	15.78	15.13	15.38

Note: High school graduates only (N=1429).

Table 4 The Effects of Curriculum on Labor Market Success for Young Men Who Do Not Go On to College

	Equation (1)	(2)	(3)	(4)	(5)
	(Log) hourly earnings				
Years completed	.047*				
Total credits		.004			
Academic			.007	.008	.008
Vocational			.005		
Non-program				-.009	-.010
Program				.004	
Not used					-.001
Used					.007
Other			-.001	-.0005	-.0005
R^2	.12	.11	.11	.11	.11
N	713	713	713	713	713
	Weeks unemployed				
Years completed	-2.620**				
Total credits		-.404**			
Academic			-.575**	-.583**	-.584**
Vocational			-.305*		
Non-program				.148	.151
Program				-.304*	
Not used					-.264
Used					-.325*
Other			-.196	-.221	-.220
R^2	.08	.07	.08	.08	.08
N	515	515	515	515	515
	Hours worked				
Years completed	239.90**				
Total credits		32.797**			
Academic			14.149	13.940	14.222
Vocational			52.331**		
Non-program				67.859*	66.554*
Program				52.281**	
Not used					35.263*
Used					61.758**
Other			47.156**	45.238**	46.127**
R^2	.14	.12	.13	.13	.13
N	515	515	515	515	515

* Significant at the .05 level.
**Significant at the .01 level.
Note: Standard errors for equation (3) appear in Appendix Table A-1. Control variables included in the regressions are described in the text; their estimated values appear in Appendix Table A-1.

Table 5 The Effects of Curriculum on Labor Market Success for Young Women Who Do Not Go On to College

	Equation (1)	(2)	(3)	(4)	(5)
	(Log) hourly earnings				
Years completed	.055*				
Total credits		.010*			
Academic			.011*	.011*	.012*
Vocational			.010*		
Non-program				.003	.002
Program				.009	
Not used					-.002
Used					.015**
Other			.008	.008	.009
R^2	.06	.06	.06	.05	.06
N	648	648	648	648	648
	Weeks unemployed				
Years completed	-2.190**				
Total credits		-.356**			
Academic			-.435**	-.433**	-.457**
Vocational			-.503**		
Non-program				-.546*	-.523*
Program				-.509**	
Not used					-.362**
Used					-.658**
Other			-.056	-.054	-.079
R^2	.05	.05	.06	.06	.06
N	565	565	565	565	565
	Hours worked				
Years completed	257.86**				
Total credits		38.710**			
Academic			47.321**	44.929**	51.138**
Vocational			55.942**		
Non-program				95.967**	88.388**
Program				60.519**	
Not used					17.073
Used					104.24**
Other			4.734	2.139	10.645
R^2	.35	.34	.35	.35	.39
N	576	576	576	576	576

* Significant at the .05 level.
**Significant at the .01 level.
Note: Standard errors for equation (3) appear in Appendix Table A-1. Control variables included in the regressions are described in the text; their estimated values appear in Appendix Table A-1.

Table 6 Effects of High School Curriculum on Labor Market Success: Proportional Specification

	Males			Females		
	(1)	(2)	(3)	(1)	(2)	(3)
	(Log) hourly earnings					
Vocational	-.081			-.009		
Non-program		-.248	-.258		-.093	-.118
Program		-.052			-.044	
Not used			-.185			-.239*
Used			.010			.066
Other	-.121	-.090	-.087	-.049	-.052	-.030
Total credits	-.006	-.008	-.008	.006	.006	.006
$\bar{R}^2$	.12	.12	.12	.04	.04	.05
N	579	579	579	582	582	582
	Weeks unemployed					
Vocational	4.311			-2.571		
Non-program		12.409**	12.681**		-1.538	-1.135
Program		3.568			-1.265	
Not used			5.990*			.487
Used			2.356			-2.821
Other	4.418	3.200	3.291	7.177**	8.326**	7.996**
Total credits	-.086	-.036	-.029	-.288*	-.312*	-.308*
$\bar{R}^2$	.06	.06	.06	.04	.04	.04
N	407	407	407	464	464	464
	Hours worked					
Vocational	603.78*			297.43		
Non-program		435.74	397.33		516.20	352.31
Program		597.00*			250.41	
Not used			251.29			-411.25
Used			744.93**			827.88**
Other	355.63	346.26	334.06	-648.00**	-779.90**	-635.62**
Total credits	-20.229	-21.259	-22.098	10.720	14.378	13.015
$\bar{R}^2$	.12	.12	.12	.33	.33	.37
N	407	407	407	467	467	467

* Significant at .05 level.
**Significant at .01 level.
Note: High School graduates only.
All curriculum area credits are the proportion of total credits in this area.
Control variables included in the regressions are described in the text.

Table 7 Percentages of Students Taking (or Not Taking) Vocational Programs in Specific Areas Who Obtained a Job in an Occupation That Corresponded to That Area by Specific Area and Sex

Vocational and occupational area (# of students in program)[a]	Vocational program status: Specific program indicated	Vocational program status: Other program or no program
	Men	
Agriculture (40)	42	17
Distributive education (16)	38	27
Health occupation (0)	-	5
Home economics (13)	4	6
Office occupation (16)	54	19
Trade and industry (191)	65	59
	Women	
Agriculture (9)	3	7
Distributive education (16)	66	28
Health occupation (16)	40	6
Home economics (97)	15	13
Office occupation (248)	60	35
Trade and industry (34)	26	32

[a]The entries for the number of students in a program are unweighted while the main entries are weighted percentages.

Table 8 The Effects of Detailed Categories of Curriculum on Labor Market Success for Young Men and Women Who Do Not Go On to College

	Males			Females		
	(Log) hourly earnings	Weeks unemployed	Hours worked	(Log) hourly earnings	Weeks unemployed	Weeks worked
Academic						
Language arts	.054**	-.600*	36.913	-.023	-.083	25.883
Foreign language	.010	-.394	-50.820	.048**	-1.099**	65.327*
Mathematics	-.021	-.674	21.069	.003	.032	8.966
Natural science	.005	-.625	21.405	.013	-.676	161.17**
Social science	-.028*	-.518	-3.066	.035*	-.427	3.266
Vocational (non-program)						
Agriculture	-.002	-1.550*	125.09			
Home economics				-.004	-.793*	36.386
Office occupations				.005	-.940*	203.11**
Trades and industry	-.042*	.610	41.411			
Other	.005	.231	67.466*	.043*	.175	41.733
Vocational (program, not used)						
Agriculture	.030	-.984	93.764			
Home economics				-.011	.067	-4.880
Office occupations				-.005	-.644**	39.874*
Trades and industry	-.012	-.362	26.973			
Other	.0004	.078	12.521	.011	-.538*	-18.609
Vocational (program, used)						
Agriculture	-.022	-.956	297.19**			
Home economics				-.019	-.904*	48.271
Office occupations				.024**	-.724**	138.22**
Trades and industry	.008	-.271	37.208*			
Other	-.010	-.617	98.874*	.012	-.667*	105.79**
Other	-.001	-.221	40.847**	.011*	-.102	17.191
$\bar{R}^2$	.13	.07	.15	.08	.07	.41
N	713	515	515	648	565	576

* Significant at .05 level.
**Significant at .01 level.
Note: Control variables included in the regression are described in the text.

Table 9 Effects of High School Curriculum on Labor Market Success for Different Samples Defined According to Race, Ethnicity, Socioeconomic Background, and Mental Ability

Sample	Academic	Vocational	Other
	(Log) hourly earnings		
Total (1361)	.010**	.007*	.002
Whites (926)	.010*	.009*	.002
Blacks (242)	.006	-.007	.015
Hispanics (193)	.018*	.014	-.001
GPA9 <= 2.2 (674)	.012*	.004	-.0004
PED <12 (455)	.018**	-.010	.008
GPA9 >2.2 (687)	.010*	.011*	.004
PED >= 12 (906)	.008	.012*	-.0002
	Weeks unemployed		
Total (1080)	-.514**	-.412**	-.133
Whites (727)	-.577**	-.446**	-.155
Blacks (207)	-.441	-.442	-.323
Hispanics (146)	-.031	-.337	-.461*
GPA9 <= 2.2 (564)	-.511**	-.413**	-.314*
PED <12 (386)	-.450**	-.551**	.121
GPA9 >2.2 (516)	-.628**	-.520**	-.085
PED >= 12 (694)	-.615**	-.420**	-.288**
	Hours worked		
Total (1091)	29.871**	55.997**	25.365**
Whites (725)	26.117**	57.510**	23.129*
Blacks (215)	38.544*	51.133*	46.736
Hispanics (151)	53.516*	75.538**	21.464
GPA9 <= 2.2 (573)	34.036**	44.217**	53.322**
PED <12 (391)	38.616**	81.314**	31.947*
GPA9 >2.2 (518)	30.697**	71.685**	4.302
PED >= 12 (700)	27.350**	47.244**	23.309*

* Significant at .05 level.
**Significant at .01 level.
Note: Control variables included in the regressions are described in the text.

Table A-1 Effects of Curriculum and Control Variables on Labor Market Outcomes for Men and Women Who Do Not Go On to College

	(Log) hourly earnings		Weeks unemployed		Hours worked	
	Male	Female	Male	Female	Male	Female
Academic credits	.007	.011	-.575	-.435	14.149	47.321
	(1.42)	(1.87)	(-4.56)	(-3.51)	(1.23)	(4.25)
Vocational credits	.005	.010	-.305	-.503	52.331	55.942
	(.76)	(1.64)	(-2.04)	(-4.02)	(3.78)	(4.83)
Other credits	-.001	.008	-.196	-.056	47.156	4.734
	(-.16)	(1.22)	(-1.29)	(-.38)	(3.36)	(.35)
Ninth grade GPA	.005	.038	.219	-.207	31.370	137.79
	(.19)	(1.71)	(.35)	(-.40)	(.57)	(2.84)
Black	-.050	.030	3.365	3.00	-393.70	8.968
	(-.98)	(.58)	(2.85)	(2.74)	(-3.55)	(.09)
Hispanic	-.043	.028	-1.207	-1.448	-34.244	221.05
	(-.63)	(.42)	(-.71)	(-.97)	(-.22)	(1.60)
Married, spouse present	.072	-.017	-1.301	-.355	320.96	-212.17
	(1.69)	(.54)	(-1.40)	(-.52)	(3.66)	(-3.27)
Months since leaving school	.006	.004	-.066	-.035	11.201	8.253
	(6.87)	(5.38)	(-2.53)	(-1.56)	(4.64)	(1.56)
Number of children	.025	-.101	.384	-.132	-170.74	-567.83
	(.54)	(-3.11)	(.41)	(-.25)	(-1.79)	(-11.48)
Parental education	.007	.002	-.274	-.147	12.421	15.546
	(1.17)	(.27)	(-1.78)	(-1.05)	(.87)	(1.22)
Cultural index	.069	.012	.517	-.005	-1.275	99.656
	(3.65)	(.71)	(1.16)	(-.01)	(-.03)	(2.75)
Constant	5.697	5.524	13.194	11.851	856.63	174.54
	(56.16)	(53.45)	(5.24)	(5.39)	(3.65)	(.88)
$\bar{R}^2$	.11	.06	.08	.06	.13	.35
S.E.E.	.37	.32	7.68	7.20	713.74	679.01
N	713	648	515	565	515	576

Note: Estimates for equation (3) in Tables 4 and 5.